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ABSTRACT

This study investigates the possibility that the reinforcement strength of stimuli can be enhanced by observational learning as well as by pairing with unconditioned reinforcers. The reinforcement strengths of two candies were determined for 40 preschool children as measured by rate of response on a button pressing apparatus. The children then observed a videotape of an adult model being rewarded in a different situation who: (1) chose one candy over the other and consumed it, (2) chose one candy over the other but did not consume it, (3) consumed one candy but did not have a choice of candies, or (4) did not receive a candy reward. Rates of response supported by each candy were then determined again. The predicted interactions of the candies, sessions, and modeling conditions were statistically significant, indicating that the reinforcement strength of the candy was enhanced by observational learning. This finding increases the viability of the concept of conditioned reinforcement in accounts of complex human behavior. (Author/SDH)

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Effects of Observational Learning on Positive Reinforcers

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ABSTRACT

The concept of conditioned reinforcement plays a central role in learning theory accounts of complex human behavior, but there have been only a few studies demonstrating the acquisition of conditioned reinforcers by human subjects. This study investigates the possibility that the reinforcement strength of stimuli can be enhanced by observational learning as well as by pairing with unconditioned reinforcers. The reinforcement strengths of two candies were determined for 40 preschool children as measured by rate of response on a button pressing apparatus. The children then observed a videotape of an adult model being rewarded in a different situation who either 1) chose one candy over the other and consumed it, 2) chose one candy over the other but did not consume it, 3) consumed one candy but did not have a choice of candies, or 4) did not receive a candy reward. Rates of response supported by each candy were then determined again. The predicted interactions of the candies, sessions, and modeling conditions were statistically significant, indicating that the reinforcement strength of the candy was enhanced by observational learning. This finding increases the viability of the concept of conditioned reinforcement in accounts of complex human behavior.

Effects of Observational Learning on Positive Reinforcers

James D. Kloss

The concept of conditioned reinforcement has been widely used by learning theorists to account for the complexity of human behavior (Bijou & Baer, 1965). Several investigators have established conditioned reinforcers for children (Lovaas et al., 1966; Steinman, 1968; Silverstein, 1972), but this body of research does not document the importance of conditioned reinforcers in the development of complex human behavior. The argument against the importance of conditioned reinforcement is much like the argument against the shaping of complex responses. Both involve difficult, uncertain processes even in the laboratory, and it seems implausible that many responses (or stimuli) are learned in this way in natural settings. Observational learning overcomes this objection and is now the mechanism of response acquisition most popular among social learning theorists (Bandura, 1969), and it may be that conditioned reinforcers can also be acquired through observation. There are several suggestions that this may be the case.

Miller and Dollard (1941) and Baer and Sherman (1964) argued that discriminative stimuli can be acquired through observation, and Bandura and Rosenthal (1966) showed the imitative learning of conditioned stimuli in a respondent conditioning paradigm. Gewirtz and Stingle (1968) proposed that imitation may be responsible for all of the learning subsumed under the rubric of socialization, including the acquisition of motives and values. If this is true both reinforcing and aversive stimuli should be learnable imitatively.

The many studies relating imitation and observational learning to the acquisition and extinction of avoidance behavior (summarized in Mischel, 1968) may be interpreted as demonstrating observationally produced changes in the strength of conditioned negative reinforcers, but little research has been done on the acquisition or modification of positive reinforcers through imitation.

It is the hypothesis of this study that a stimulus that is observed to reinforce a model's behavior will gain strength as a reinforcer for the observer's behavior. To test this hypothesis, the reinforcement strengths of two candies were determined for children in a simple operant situation. Following determination of these reinforcement strengths for each child, the children observed a model in an entirely different situation who appeared to be reinforced by the candy that was each child's own weaker reinforcer. The children then resumed the operant task, and an increase in the rate of response for the modeled reinforcer was predicted.

METHOD

Subjects: The subjects in this experiment were 24 boys and 16 girls between the ages of 3 and 6 years recruited from nursery schools in Columbia, Missouri.

Apparatus: Two sets of apparatus were used, one for the recording of responses and one for the presentation of stimulus conditions. The response apparatus consisted of two magazines programmed on a multiple (VR-5, VR-5) reinforcement schedule. The candies used as reinforcers were small, sugar coated mints and ordinary, penny gum balls. The operandum was a push button switch, and responses were recorded by counters.

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The stimulus apparatus consisted of a portable videotape unit and seven prerecorded videotapes about 2½ minutes in length. Each tape portrayed an adult, female model playing with a bowling game and a ring toss game. In the Choice-Consume condition, a female experimenter offered the model a choice between mints and gum balls as a reward for doing well on the games. The model expressed a verbal preference for one of the candies (two versions were available), chose that candy and ate a few pieces with apparent pleasure. The model then displayed eagerness in returning to the games, and the entire sequence was repeated three times.

The model's behavior in the Choice, Consume, and Control tapes was identical to her behavior in the Choice-Consume tape with the exception of the reward sequence. In the Choice condition, the model chose between mints and gum balls, but, instead of consuming the candy, the experimenter instructed the model to put the candy into a bag to take home. In the Consume condition, the model did not have a choice of candies. Indeed, only one candy was shown in the Consume tape. The model did, however, accept the candy offered her by the experimenter, consume it with pleasure, and eagerly return to the games. In all of these conditions, the model was rewarded by the subject's Disfavored candy, as determined during the Pretest phase of the experiment. By definition, the candy that supported the lower rate of response during the Pretest session is called the Disfavored candy, and the object of the manipulation is to increase its strength as a reinforcer. In the Control condition, the reward sequence was omitted and candy was not even shown in the tape.

Procedure: The experimenter was introduced to each child by the child's teacher, and each was given a set of standard instructions. Subjects familiarized themselves with the apparatus and recieved one of each kind of candy. As a control for satiation, these samples were the only candies the subjects were allowed to eat during the experiment.

The button-pushing response was then conditioned with each reinforcer until the response rate stabilized. The cumulative number of responses was recorded at 15 second intervals. After acquisition the reinforcement programmer was swithced to a VR-5 schedule and the 4 minute long Pretest session began. During the Pretest session, each candy was available for eight 15 second intervals. The candy available changed according to a predetermined random schedule.

Whether the subject watched the Choice-Consume, Choice, Consume, or control videotape at the close of the Pretest session was predetermined according to a random assignment of subjects to conditions. The version of the stimulus tape that the subject saw was determined by his own rates of response in the Pretest; in all cases the subject saw a tape in which the model chose or consumed the candy that supported the lower rate of response in the Pretest session.

A four minute Posttest session followed the videotape. Each candy was again available for eight 15 second intervals according to the same schedule as in the Prestest session.

RESULTS

The experimental design is a 2 by 2 by 4 by 2 as shown in Table 1. The four variables are A) Sessions -- Pretest, Posttest, B) Candy -- Favored candy, Disfavored candy, C) Videotape -- Choice-Consume, Choice, Consume, Control, and D) Sex -- Male, Female. The response measure is the total number of responses emitted for each candy which is equivalent to the response rate since the candies were available for equal periods. The data were analyzed using a four way analysis of variance with two repeated measures (Winer, 1962). A summary of this analysis is shown in Table 2 and cell means are given in Table 1. The items of interest are the Session by Candy by Videotape interaction and the Session by Candy interaction.

Insert Tables 1 & 2 about here

The significant Session by Candy by Videotape interaction ($F = 4.17$, df = 1/32, $p < .05$) indicates that the videotapes differed in their effects on response for the Disfavored candy. The difference between the Favored and Disfavored candies by session and videotape condition is plotted in Figure 1. It shows that relative preference

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Insert Figure 1 about here

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for the originally favored candy declines slightly in the Control condition even though there was no candy or modeled reward sequence in this condition. A more drastic change in preference occured

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after observing the Choice or Consume tapes in which the model either ate one of the subject's disfavored candies or chose that candy in preference to the child's favored candy. An even stronger reversal of preference occurred after watching the Choice-Consume tape which combined both manipulations. The Session by Candy interaction is also significant ($F = 45.82$, df = 1/32, $p < .01$) and is shown in Figure 2. As predicted, the rate of response for the initially Disfavored candy increased relative to the Favored candy after viewing the videotapes.

Insert Figure 2 about here

There is an unpredicted, significant ($p < .01$) main effect for Sessions; rates of response increased during the Posttest session for both candies in all Videotape conditions. The significant ($p < .01$) main effect for Candy is a direct consequence of the experimental design. By definition, the Favored candy was the reinforcer that supported the higher rate of response for each child in the Pretest session.

DISCUSSION

The results of this study support the experimental hypothesis: Observing a model who is reinforced by a stimulus increases the strength of that stimulus as a reinforcer for the observer's behavior. The Session by Candy by Videotape interaction indicates that observation of a model's choice behavior and observation of a model's consumatory behavior both affect the reinforcing strength of a

stimulus.

The clarity of this finding is marred by the overall increase in response rate; the results would have more impact if the response for the initially Favored candy had remained constant or even declined. One may speculate that the Sessions effect could be due to habituation to the experimental situation, reduction of other anxiety, or some other uncontrolled variable. Parton and Ross (1965), in a review of the social reinforcement literature, reported that an upward trend in response rate that is not a function of current reinforcement contingencies is often found. They suggested that an appropriate control condition like the one in this study should be provided. The hypothesised effect is then tested as an interaction, independent of any trend across sessions.

As they stand, the results of this study indicate that the reinforcement strength of a stimulus can be affected by observation, and the rapidity and flexibility of observational learning should greatly enhance the viability of conditioned reinforcement as an operating factor in human development.

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Figure 2. Session by Candy interaction. Average number of responses for the Favored and Disfavored candies in the Pretest and Posttest sessions.

TABLE 1

Experimental Design and Individual Cell Means

for Number of Responses

	MALE (D1) Videotape				FEMALE (D2) Videotape				
	Choice-Consume (C1)	Choice (C2)	Consume (C3)	Control (C4)	Choice-Consume (C1)	Choice (C2)	Consume (C3)	Control (C4)	$\bar{A}_{C \cdot D}$
Favored candy (A1) PRETEST (B1)	62.83	63.50	68.00	70.17	111.50	70.75	63.25	48.25	69.05
Disfavored candy (A2)	55.83	58.00	58.67	62.33	103.25	66.25	54.25	45.50	62.10
Favored candy (A1) POST-TEST (B2)	77.16	78.83	99.67	103.00	127.50	78.50	83.25	61.75	88.90
Disfavored candy (A2)	82.83	80.50	99.50	96.00	133.50	85.50	83.25	61.50	90.20

TABLE 2

Analysis of Variance Summary Table

Total Number of Responses

Source	df	MS	F
Between Subjects	39	5181.29	
Film Condition (C)	3	2727.95	
Sex (D)	1	570.41	
C X D	3	10690.86	
Error Between	32	5038.86	
Within Subjects	120	370.04	
Candy (A)	1	319.22	7.53**
A X C	3	55.09	
A X D	1	51.34	
A X C X D	3	18.98	
Session (B)	1	22992.02	46.88**
B X C	3	393.49	
B X D	1	676.71	
B X C X D	3	185.62	
A X B	1	680.62	45.82**
A X B X C	3	61.88	4.17*
A X B X D	1	6.68	
A X B X C X D	3	2.24	
Error Within	96	182.57	
Error 1 (w)	32	42.38	*p/0.05
Error 2 (w)	32	490.47	**p/0.01
Error 3 (w)	32	14.85	
Total	159	1550.16	

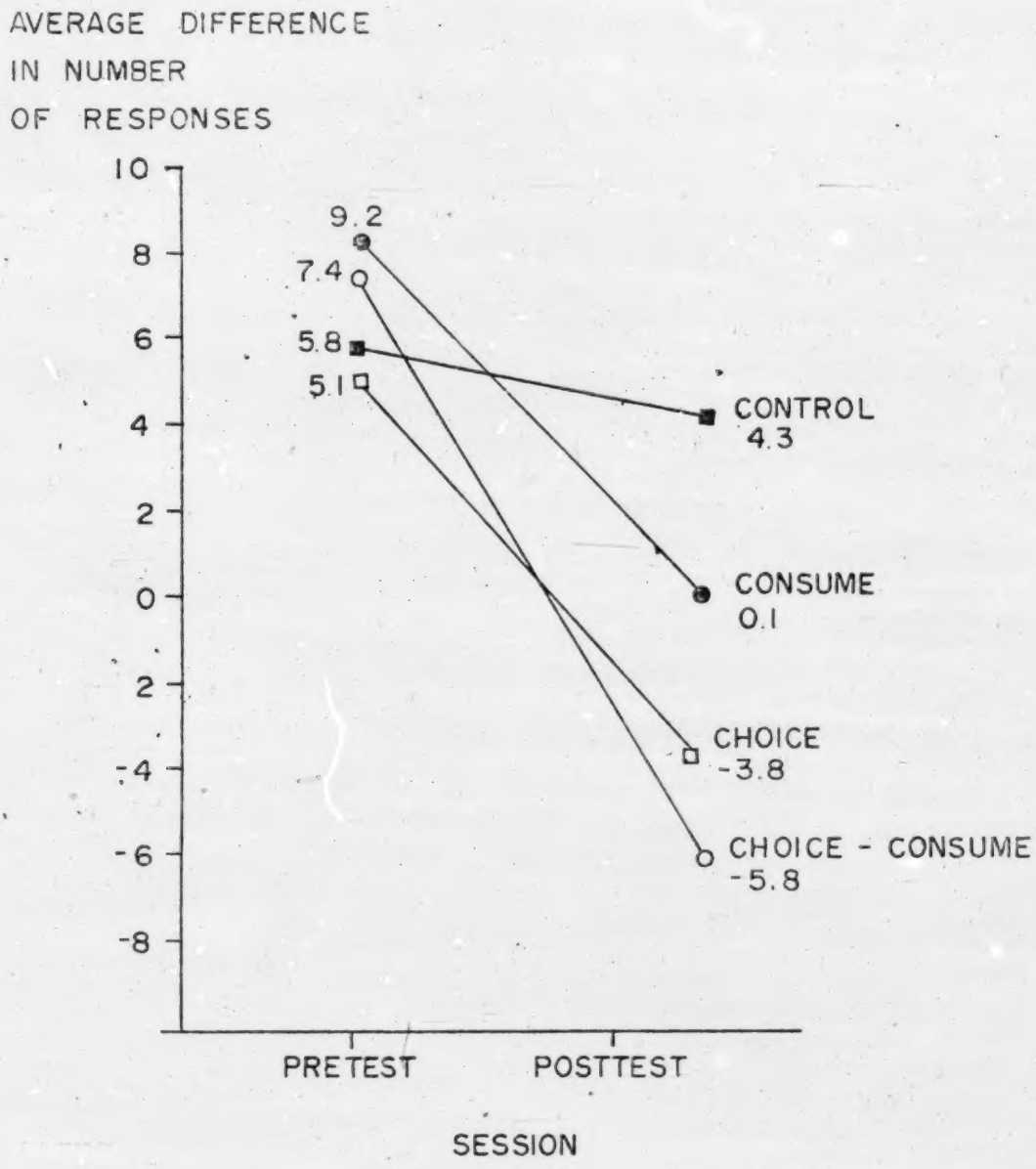

FIGURE 1

SESSION BY CANDY BY VIDEOTAPE

INTERACTION

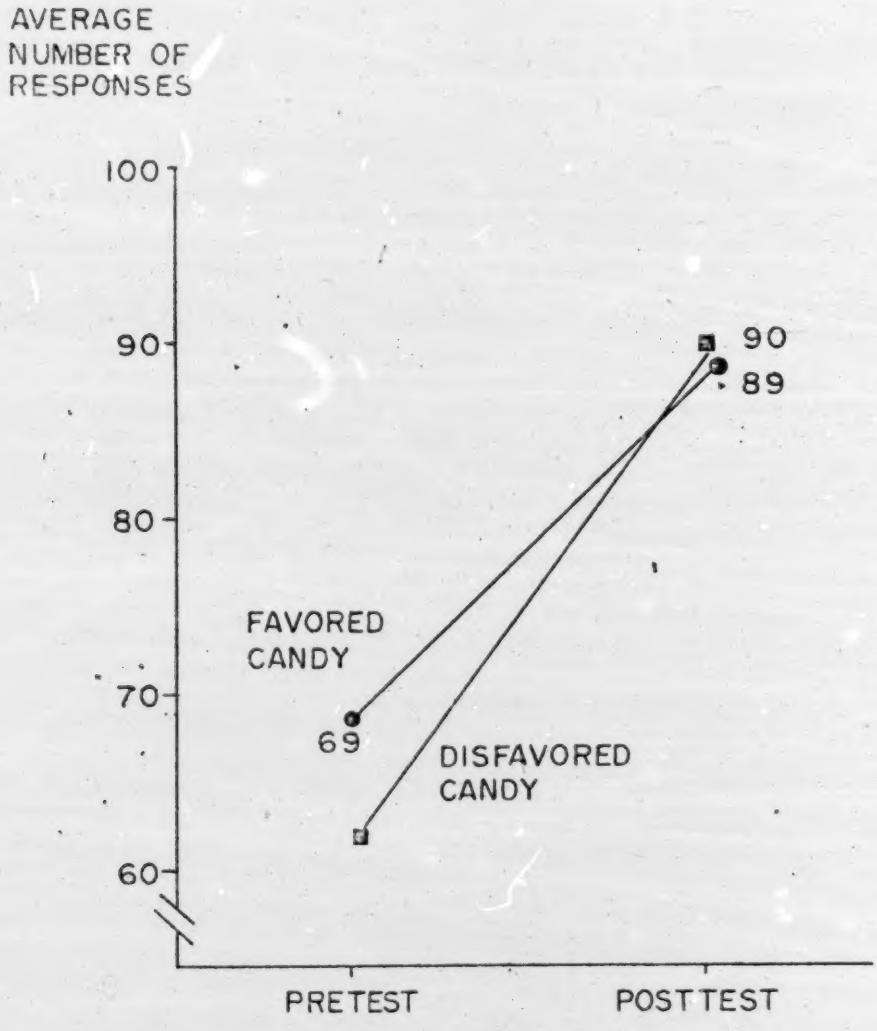

FIGURE 2

SESSION BY CANDY INTERACTION